US005940464A

United States Patent [19]

Mardon et al.

[11] Patent Number: 5,940,464

[45] Date of Patent: Aug. 17, 1999

[54] **TUBE FOR A NUCLEAR FUEL ASSEMBLY, AND METHOD FOR MAKING SAME**

[75] Inventors: **Jean-Paul Mardon**, Caluire; **Jean Senevat**, Saint Brevin Les Pins; **Daniel Charquet**, Ugine Cedex, all of France

[73] Assignees: **Framatome**, Courbevoie; **Compagnie Generale des Matiéres Nucléaires**, Velizy-Villacoblay, both of France

[21] Appl. No.: **09/000,104**

[22] PCT Filed: **Jul. 22, 1996**

[86] PCT No.: **PCT/FR96/01149**

§ 371 Date: **Apr. 20, 1998**

§ 102(e) Date: **Apr. 20, 1998**

[87] PCT Pub. No.: **WO97/05628**

PCT Pub. Date: **Feb. 13, 1997**

[30] **Foreign Application Priority Data**

Jul. 27, 1995 [FR] France 95 09166

[51] **Int. Cl.**[6] **G21C 3/07**

[52] **U.S. Cl.** **376/457**; 420/422; 148/672

[58] **Field of Search** 376/414, 416–418, 376/457, 260, 261; 148/672; 420/422

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,023,048	6/1991	Mardon et al.	376/416
5,254,308	10/1993	Garde et al.	420/422

FOREIGN PATENT DOCUMENTS

0533073	9/1992	European Pat. Off. .
94/23081	10/1994	WIPO .

OTHER PUBLICATIONS

Patent Abstracts of Japan—vol. 016, No. 393 (P–1406), Aug. 20, '92 & JP,A,04 128687 (Nuclear Fuel Ind. Ltd.), Apr. 30, '92.

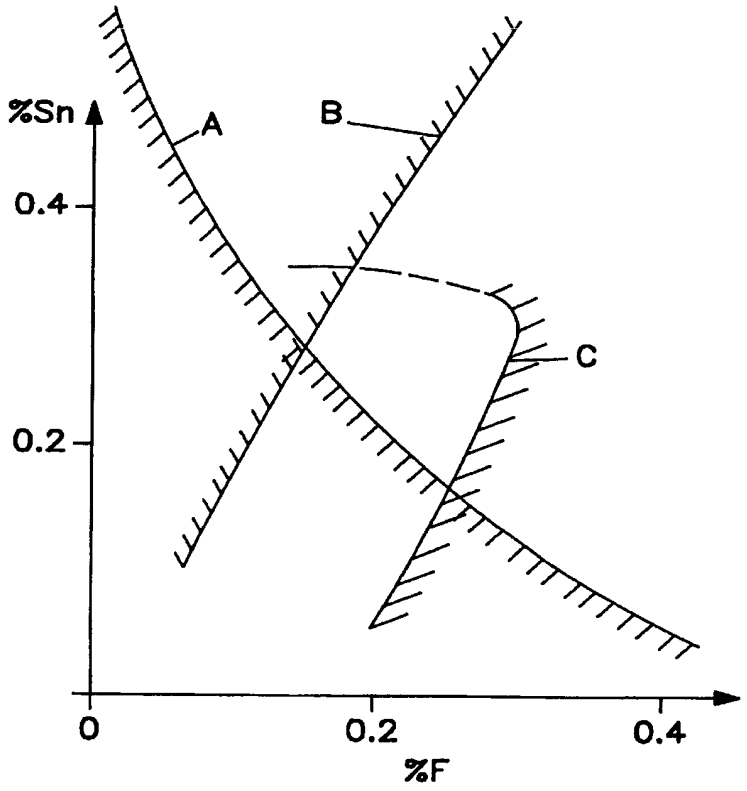
Primary Examiner—Daniel D. Wasil

Attorney, Agent, or Firm—Law Offices Pollock, Vande Sande &Amernick

[57] **ABSTRACT**

A zirconium alloy tube for forming the whole or the outer portion of a nuclear fuel pencil housing or a nuclear fuel assembly guide tube. The zirconium alloy contains 0.8–1.8 wt. % of niobium, 0.2–0.6 wt. % of tin and 0.02–0.4 wt. % of iron, and has a carbon content of 30–180 ppm, a silicon content of 10–120 ppm and an oxygen content of 600–1800 ppm. The tube may be used when recrystallized or stress relieved.

8 Claims, 3 Drawing Sheets



ABSTRACT

A zirconium alloy tube for forming the whole or the outer portion of a nuclear fuel pencil housing or a nuclear fuel assembly guide tube. The zirconium alloy contains 0.8-1.8 wt. % of niobium, 0.2-0.6 wt. % of tin and 0.02-0.4 wt. % of iron, and has a carbon content of 30-180 ppm, a silicon content of 10-120 ppm and an oxygen content of 600-1800 ppm. The tube may be used when recrystallized or stress relieved.